WE CLAIM:

1. A hyper-spectral imaging system comprising:

imaging foreoptics to focus on a scene or object of interest and transfer the image of said scene or object onto the focal plane of a spatial light modulator;

a spatial light modulator placed at a focal plane of said imaging foreoptics;

an imaging dispersion device disposed to receive an output image of said spatial light modulator; and

an image collecting device disposed to receive the output of said imaging dispersion device.

2. The system of claim 1, wherein said image collecting device is a device from the set consisting of a CCD array camera, CID**B.** array or camera, CMOS array or camera, micro-bolometer array or camera, a Focal Plane Array or camera.

3. The system of claim 1, wherein said spatial light modulator is a micro-mirror array, 2-D Liquid crystal array, micro-shutter array, or mechanically translated 2-D mask.

4. The system of claim 1, wherein said spatial light modulator is capable of directing coded patterns of radiation in two or more distinct directions at least one of which leads into said imaging dispersion device.

5. The system of claim 4, wherein at least one of the spatial light modulator directions leads to a broadband imaging system.

6. The system of claim 4, wherein at least two or more of the spatial light modulator directions lead to distinct imaging dispersion systems analyzing non-identical wavelength regions.

7. The system of claim 1 incorporating a beam-splitter or removable fold mirror placed in the optical path before dispersion device capable of redirecting incoming radiation and placing image of scene or object of interest at the focal plane of one or more additional distinct hyperspectral imaging systems analyzing one of more non-identical wavelength regions.

8. The system of claim 1, wherein the coded apertures controlled by the spatial light modulator consist of submodulated superpixels which focus (in the spatially coherent direction) on the pixels of the image collecting device consequently increasing its spatial resolution.

9. The system of claim 1, wherein the spatial light modulator is controlled to analyze only a not necessarily contiguous subportion of the full image field of the system.

10. The system of claim 1, wherein the image collecting device is controlled to measure only a not necessarily contiguous subportion of the full field of possibly impinging radiation.

11. The system of claim 1, wherein the spatial light modulator can control the size of spatial-spectral resolution elements.

12. The system of claim 1, wherein the spatial light modulator is driven to present coded in controlled to enable multiplexing in the direction of dispersion by using coded aperture patterns from the set consisting of 2-D Hadamard codes, 2-D Walsh-Hadamard codes, 2-D Wavelet Packet codes, psuedorandomized versions of the preceding three, single slit patterns in the direction perpendicular to dispersion, 1-D Hadamard encodements of said slit patterns, 1-D Walsh-Hadamard encodements of said slit patterns, Wavelet-Packet encodements of said slit patterns, and psuedorandomized versions of the preceding three.

13. The system of claim 1, wherein the spatial light modulator is driven to present coded in controlled to enable multiplexing in the direction of dispersion by using coded aperture patterns from the set consisting of 2-D Hadamard codes, 2-D Walsh-Hadamard codes, 2-D Wavelet Packet codes, psuedorandomized versions of the preceding three, single slit patterns in the direction perpendicular to dispersion, 1-D Hadamard encodements of said slit patterns, 1-D Walsh-Hadamard encodements of said slit patterns, Wavelet-Packet encodements of said slit patterns, and psuedorandomized versions of the preceding three, any non-degenerate finite set of 2-D encodements.

14. The system of claim 1, wherein the spatial light modulator is driven to emulate a conventional slit-scan imaging spectrograph by allowing only a line/slit perpendicular to the dispersion access to propagate through the system and then translating said slit from one end of full field of view to the other.

15. The system of claim 14, wherein slit width and height and location are controlled to enable the control of spectral and spatial resolution as well as the possibility to analyze a subregion of the full field of view.

16. The system of claim 1, wherein all imaging foreoptics and dispersion system all emply offner type reflective imaging optics which allow performance over multiple wavelength regions.